2019

A Case Report: Factors Influencing the Physical Therapy Care Following Medical Treatment of an Anaplastic Oligodendroglioma

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A Case Report: Factors Influencing the Physical Therapy Care following Medical Treatment of an Anaplastic Oligodendroglioma

by

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Bachelor of Arts in Biology and Environmental Studies

Concordia College, 2016

A Scholarly Project Submitted to the Graduate Faculty of the

Department of Physical Therapy

School of Medicine and Health Sciences

University of North Dakota

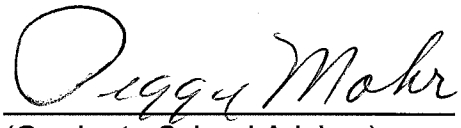
in partial fulfillment of the requirements for the degree of

Doctor of Physical Therapy

Grand Forks, North Dakota

May, 2019

This Scholarly Project, submitted by Connor Camrud, in partial fulfillment of the requirements for the Degree of Doctor of Physical Therapy from the University of North Dakota, has been read by the Advisor and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.



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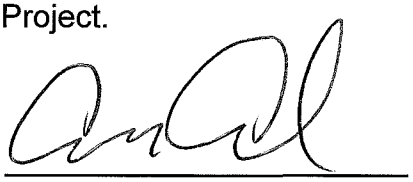
Signature 

Date June 13, 2018

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ACKNOWLEDGEMENTS

I would like to thank my clinical instructor and faculty advisor for all of their assistance throughout my clinical rotation and composition of this case report. Their advice, support, and encouragement has been much appreciated throughout the course of my clinical education and the application of this scholarly project.

ABSTRACT

Purpose The purpose of this case report is to describe the clinical decision-making processes of the physical therapy (PT) care for a patient who was diagnosed with an anaplastic oligodendroglioma and subsequently had surgical decompression and resection, chemotherapy, and radiation.

Background Anaplastic oligodendrogliomas account for 3% to 20% of all brain tumors. The incidence of this tumor is 40% greater in males than females. Average onset occurs between 35 and 44 years of age. Anaplastic oligodendrogliomas commonly occur in the frontal lobes and are supratentorial. Patients will often present with headaches, new weakness, vision changes, and a decline in cognitive functioning; seizures are also a possible clinical sign.

Case Description The patient was a 39-year-old male who was diagnosed with a grade III anaplastic oligodendroglioma. He underwent surgical decompression and resection, chemotherapy, and radiation. He participated in 4 months of PT following the surgery (1-month inpatient and 3-months outpatient), an additional 6 months of outpatient PT following a set-back due to scar tissue formation 2 years later, and presented to outpatient PT for a third time since the surgery due to recent falls.

Intervention Interventions included balance training, lower extremity strengthening, and gait progression retraining.

Outcomes The patient improved in his single-leg stance test (SLST) balance ability, 5 times (5x) sit to stand test time, and 10-meter walk test (10MWT) scores.

Discussion Due to attendance issues, this patient did not progress as quickly as projected. Many personal and familial factors altered his participation throughout the therapy sessions.

CHAPTER I

BACKGROUND AND PURPOSE

Anaplastic oligodendrogliomas are the least common form of all gliomas accounting for 3-20% of all brain tumors, depending upon the study cited. The peak age of occurrence is between the ages of 35 and 44 and males have a 40% greater risk of developing anaplastic oligodendroglioma over females. This type of glioma most commonly develops in the frontal lobe and, as such, is usually supratentorial. A patient may present with new seizures as the first clinical symptom, but more often the signs and symptoms will be less drastic and begin with neurologic symptoms such as focal weakness, headaches, vision changes, or cognitive declines due to the mass of the tumor subsequently compressing neural tissues. Maximal resection of the tumor mass and decompression of the brain tissue is the first-line of treatment. This surgery is followed by chemotherapy and radiation treatments, though some physicians may recommend delaying radiation as the oligodendrogliomas often respond positively to chemotherapy alone. Progressive radiation treatments may increase the risk for further cognitive harm and as such compound or exacerbate the post-treatment functional deficits.[1]

A brief review of literature was performed in order to determine the evidence-based course of therapy for a patient following a brain tumor resection.

The reason for the brevity was that it soon became clear there was a dearth of studies relating to the post-surgical physical therapy care of a patient who had a brain tumor. While this patient did not endure a stroke, his symptoms of hemiparesis resulting from a brain injury resembled a stroke in chronic presentation. As such, the literature reviewed for this case focused primarily on an article titled *Muscle strengthening for hemiparesis after stroke: A meta-analysis* authored by Wist et al.[2] This article discussed the 4 main types of beneficial interventions for post-stroke patients: progressive resistance training, task-specific training, intensive aerobic exercise, and functional electrical stimulation. Their results demonstrated that statistically significant strength gains are possible in patients within the chronic recovery phase (9-66 months) post-stroke. The conclusion reached was that, of the intervention types, progressive resistance training provided the most efficient method of improving strength, walking distance, walking speed, and balance when properly tailored to the patient.

The purpose of this case report is to describe the many aspects of the clinical decision-making processes that factored into the care of this patient. The goal is to demonstrate the rationale and thought-processes that were incorporated into the care of a patient during the chronic phase of recovery 3 years after the surgical decompression and resection of an anaplastic oligodendroglioma, chemotherapy, and radiation. Topics covered will include the impairments discussed within the context of a disability model, the factors

influencing the patient's care, and the decision-making processes which factored into this patient's plan of care.

CHAPTER II

CASE DESCRIPTION

The patient was a 39-year-old male with a history of a grade III anaplastic oligodendroglioma status-post surgical decompression and subsequent radiation and chemotherapy. Diagnosis and surgery occurred in late 2014. The patient underwent inpatient rehabilitation for one month, outpatient rehabilitation for 3 additional months, then was discharged. According to documented encounters, the patient made good progress in returning to a functional lifestyle but continued to have a left-sided hemiparesis. He returned to work as a civil engineer with modified 30-hour work-weeks, but this work schedule proved to be too intensive and he transitioned to disability status. In early 2016, the patient had a setback due to a build-up of scar tissue in the neurological area of the tumor resulting in increased deficits and fatigue. He then underwent another 6 months of outpatient physical therapy.

In 2017, he had primarily been training with a community center personal trainer 3 times per week. During these sessions, he focused on maintaining and gradually improving his strength and balance. Following 2 recent falls, the patient decided to seek physical therapy care and reported that he was experiencing a new onset of regressive function which caused him to worry about his safety. The patient reported that he did not perform any exercises at home due to the

inherent risk involved with his condition and was presently searching for a new personal trainer (his personal trainer had recently left the community center to transition career paths). On a side note, it was discovered at a session that he was not previously aware that the "PTs" (Personal Trainers) at the community center were not Physical Therapists. The patient found a temporary new trainer at the community center and continued to work out a couple times per week at the center throughout the duration of therapy with this new trainer.

The patient was married and had 2 elementary-aged children. They lived in a multi-story house that required ascending 3 steps to enter, 14 steps to the lower level, and 14 steps to the upper level; a railing was only present on one side of the stairways. His bed and bath were on the main level and rarely was he required to use the stairs. His in-laws had moved in shortly after the surgery and were presently living in the basement to assist with household chores and childcare. He reported being licensed and able to drive and often transported himself to therapy sessions.

Examination, Evaluation, and Diagnosis

Evaluation was based recommended evaluation and testing procedures Magee's[3] orthopedic textbook. This evaluation consisted of a relevant history, observation, range of motion (ROM), strength testing, functional assessments, and a review of the patient's medical notes and diagnostic imaging.

Upon observation, the patient was noted to have a nearly flaccid left upper extremity. The patient could open and close his hand with minimal strength and move his left upper extremity through approximately 25% normal range in a

flexion synergy pattern. He had a forward head and rounded shoulders posture while seated, moderate trunk control, and preferred to remain slouched into flexion. His left upper extremity rested at his side. An unmeasured sub-acromial sulcus was present on the left side. He presented using a right-handed Lofstrand crutch and a left ankle foot orthosis (AFO). Facial palsy was present on the left and the patient's glasses would often slip forward, requiring adjustment. His speech was fully intelligible with mild slurring coinciding with increased fatigue; no dysarthria or aphasia was present. The patient maintained a flat affect throughout conversation.

At the initial evaluation, the patient presented with no apparent memory deficits, but as therapy continued his cognitive deficits became more apparent in his inability to maintain a schedule. Cognitive deficits were also present in his inability to recall receiving reminder calls from the clinic and to recall events from the previous therapy session.

The patient utilized a step-to gait pattern and leaned heavily upon his crutch. Uneven stride lengths were demonstrated and his gait speed was irregular, bilaterally, but steady. He performed a half-turn while approaching the chair and seated himself in a controlled manner, utilizing his crutch and his right leg for a majority of the support. When requested, he was able to perform a sit-to-stand without the use of his crutch in a safe and timely manner, albeit with more effort.

Balance was stable while using his crutch and the patient had learned how to function quite well despite his impairments. While standing, he was able to

maintain his balance as he turned his head to gaze around the therapy department.

Hip, knee, and ankle strength testing was performed in sitting utilizing resisted isometrics (see Table 1). Range of motion was assessed in supine with primarily passive ROM performed. Upper body strength testing was deferred as the patient was functional in his right upper extremity and nearly flaccid in his left upper extremity. The patient presented with functional ROM throughout both lower extremities, with the exception of bilateral hamstring tightness which limited his straight leg raise to 45 degrees of flexion. No special testing was performed as the patient presented to physical therapy 3 years post-diagnosis with many years of rehabilitation services. The initial evaluation also included functional assessments (see Table 2). Functional assessments incorporated were the 5 times (5x) sit to stand test, the 10-meter walk test (10MWT), the single-leg stance test (SLST), and the Berg balance scale.

Table 1. Lower Extremity Strength±

Hip	**Right**	**Left**
Globally	5/5	4/5
Knee		
Flexion	5/5	3/5
Extension	5/5	3/5
Ankle		
Plantarflexion	5/5	2/5
Dorsiflexion	5/5	2/5

± Via manual muscle testing grades: normal=5/5, good=4/5, fair=3/5, poor=2/5, minimal=1/5, absent=0/5

Table 2. Balance and Functional Tests

	Initial	Final	Change
Normal Stance (Eyes Closed)	10+ sec.		
Normal Stance (Eyes Open)	120+ sec.		
Single-Leg Stance Test – Right Leg	~1 sec.	~5 sec.	+4 sec.
Single-Leg Stance Test – Left Leg	<1 sec.	<1 sec.	No change
5x Sit to Stand Test	10.43 sec.	8.93 sec.	-1.5 sec.
Berg Balance Scale	44/56		
10-Meter Walk Test	.28 m/sec.	.40 m/sec.	+.12 m/sec.

To conclude this section, the PT diagnosis will be further discussed in relation to the Nagi disability model[4] (see Figure 1). As a background, the Nagi model is a disablement model and as such focuses on the impairments and how they impact or limit a person's ability to fulfill their personal role within society. To describe the patient's function in relation to the model, the active pathology at play is a previous anaplastic oligodendroglioma which was medically treated with surgical decompression, chemotherapy, and radiation therapy. This pathology and concurrent medical intervention left the patient with primary physical impairments of left-sided hemiparesis, decreased strength and coordination, and impaired cognitive functions. These primary impairments led to the secondary impairments of a subluxed left shoulder as well as bilateral hamstring tightness due to a lack of activity. The functional limitations that resulted were decreased

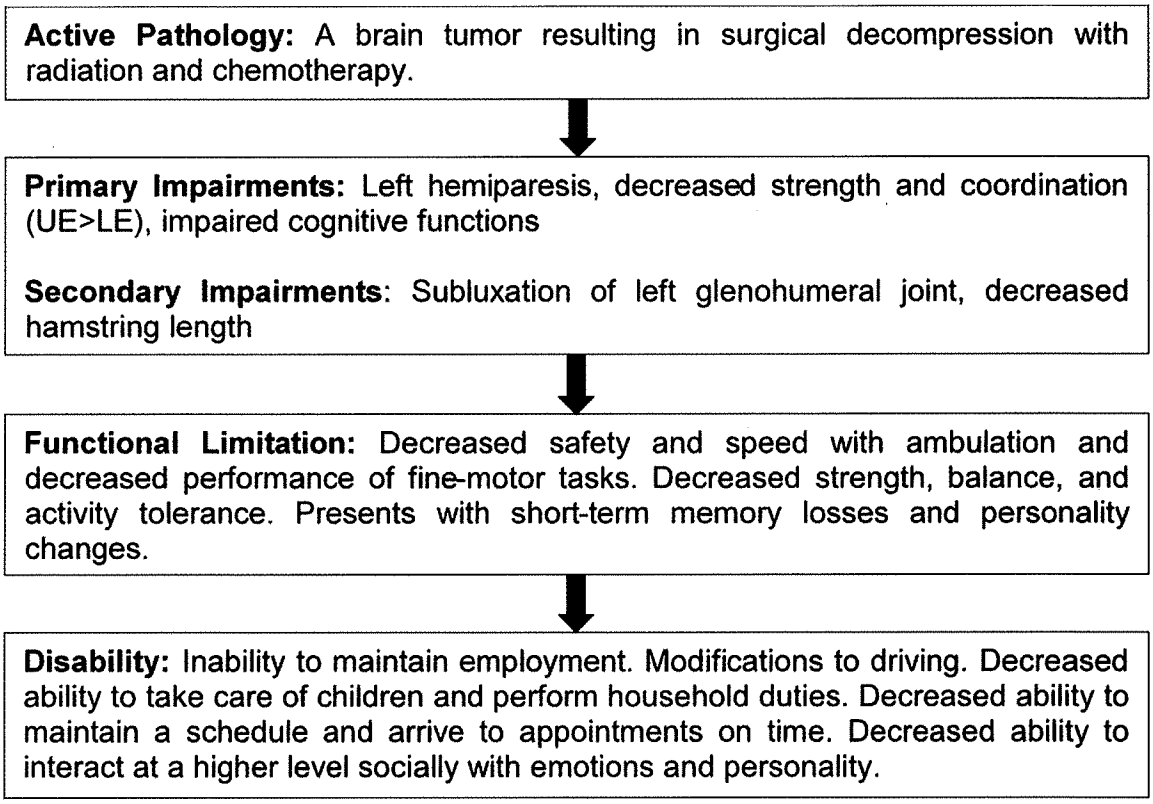

Figure 1. Nagi Disability Model

strength, balance, activity tolerance, ambulation speed and safety, fine-motor skills, short-term memory, and cognition. The disabilities resulting from these limitations included the inability to maintain employment, drive without modifications, perform household tasks and care for his children, recall and arrive to appointments on time, and interact on a higher social level due to the personality changes and the maintained flat affect. Many of these functional impairments and disabilities are referenced throughout the remainder of this report as to their relation to providing and receiving physical therapy care. The impact of the quantitative data in the initial functional assessments and demonstrated improvements (see Table 2) will be discussed further in Chapter IV – Outcomes.

Prognosis and Plan of Care

Over the course of the first 6 weeks, the patient was only seen 6 times, including the initial evaluation, as he would regularly schedule PT sessions and subsequently forget the appointment, acquire a seasonal illness, go on vacation, or have family arrive unexpectedly; all of which restricted his ability to attend therapy sessions. Due to all of these disturbances in attendance, the outcome measures were limited.

The patient's initial prognosis was deemed to be fair due to the extensive history of neurological trauma induced by the oligodendroglioma, surgery, chemotherapy, radiation therapy, and the recurrent buildup of scar tissue which decreased the patient's functional ability further. Also, relating to the chronic nature of these impairments, as the patient was 3 years removed from the initial surgery and a year-and-a-half removed from the scar tissue setback, the likelihood of regaining even near-complete function was minimal. As referenced by Wist et al,[2] it has been shown that functional improvements are achievable up to 5 years following a stroke and thus this patient did have the ability to improve his current level of function.

The patient was scheduled for 2 visits per week for 6 weeks. Since this patient was seen by a student physical therapist, during a limited clinical rotation, it was anticipated that the patient would continue physical therapy services at the clinic following the conclusion of this clinical. Due to the patient's difficulties with attendance and the long-term anticipation of therapy following the student's departure, discharge planning was not performed.

CHAPTER III

INTERVENTIONS

Interventional goals were to address the patient's strength, balance, and gait abilities. The therapy sessions included a variety of standing functional activities along with seated strengthening; the patient fatigued very quickly and would experience left lower extremity spasms if pushed too intensely. Thus, variances in exercise duration, intensity, and position had to be included in accordance to the patient's physical and verbal responses. There were only 4 therapy sessions completed between the initial evaluation and the re-evaluation. The therapy interventions over the course of the 4 visits included assisting the patient on the NuStep machine, as care was needed and supervision with some ingenuity required to ensure his left lower extremity did not get injured while in use. This was incorporated to help facilitate reciprocal motions and to assist with activity tolerance. The seated exercises included hamstring curls on an exercise ball, hamstring curls with a TheraBand, bridging, marching, hip rotations with a TheraBand, straight leg raises, and dynamic reaching and rotational activities focusing on core strength and balance on unstable surfaces with reactive motions incorporated throughout. Standing exercises included weight shifting to encourage increased weight bearing in his left lower extremity, cuing to achieve

terminal knee extension, marching as able for single-leg stance progressions, and balance activities on foam. A gait belt and assistive support were provided by the therapist and wall bars were used as necessary for safety. These interventions were intended to improve the patient's strength, neuromuscular control, and activity tolerance all while providing a social outlet and re-building the patient's personal confidence in his physical function.

The aspects that factored into the application of the interventions in relation to the plan of care for this patient can be further analyzed using the Johari Window[5] model (see Figure 2). The Johari Window allows for an analysis of aspects which have affected the care of the patient which are either known or unknown by one or both parties. As they have been documented in this model, many of the aspects were eventually discovered by the respective parties at future visits but were initially unknown. The information included within the Johari Window model will be further discussed in the following paragraphs.

In the category that was known by both parties, the physical deficits that have arisen following the medical interventions are the primary feature; this window would be the knowledge that the plan of care was initially built around.

The category that was known by the PT but unknown by the patient included aspects such as his short-term memory impairments and the level of social support necessary to ensure a productive therapy session. It was eventually realized that the patient utilized the therapy, and personal training sessions, as his social involvement. Throughout the course of his care, suggestions were provided as to how the patient could complete these exercises

in an independent fashion, without having to pay for either therapy or training, but he was not very receptive to the ideas. Without hearing him openly state it, it was theorized that he did not want to be a burden to others if he was not paying for the care provided directly. As the therapy sessions continued, the patient also began to take for granted the extra services offered such as the scheduling changes made to accommodate for him missing and forgetting sessions or the extra phone call reminders provided by the office manager in order to improve the likelihood of attendance.

	Known by Patient	Unknown by Patient
Known by PT	▪ Left Hemiparesis ▪ Functions around house and community; able to drive ▪ Returned to work for a short time period ▪ Decreased activity tolerance ▪ Maintained cognitive abilities ▪ Tech savvy ▪ Easily irritated ▪ Husband, father, engineer	▪ Short-term memory issues ▪ Depends on therapy/training sessions for social support ▪ Support staff makes accommodations to scheduling and reminder calls; patient eventually comes to expect therapist availability ▪ Fear of burdening others
Unknown by PT	▪ Reads every medical note; becomes annoyed when medical professionals copy forward notes ▪ Depth of family structure and support available ▪ Social support outside of family	▪ Psychological well-being

Figure 2. Johari Window

In terms of what was originally known by the patient and unknown by the PT was that this patient enjoyed reading the medical notes as made available through the patient-portal and became very annoyed when he read notes that were copied forward. The notes written during the present sessions did not partake in this copy-forward activity; it was only discovered when he made a comment about some of his previous care providers. He noted how it made him feel like it was not personalized care. The other factors in this window encompassed his familial and social levels of support. What was known was that his in-laws had come to live alongside his family following the surgery. It was never fully known the depth of support this patient received from his family or from others outside of his family.

The final window included that which was unknown by both parties. Throughout the course of therapy, the overall psychological well-being of the patient was never fully understood. It is unknown if the patient was even consciously aware of his own psychological well-being and what effects this may have been having on his health and function since the initial diagnosis and surgery. As such, provided care was administered in accordance to the verbal responses and statements provided by the patient.

CHAPTER IV

OUTCOMES

As was mentioned, the patient was expected to continue to receive physical therapy care following the student physical therapist's departure, and the outcome measurements depicted in Table 2 were gathered on the final visit with the student therapist. The patient had demonstrated some gains, which likely equated to functional improvements, in the few sessions attended. These results were only preliminary and more improvement was expected as the sessions continued. He was concurrently visiting the community center for personal training sessions. However, it was unknown as to how often and to what extent he was able to participate in those sessions due to the interruptions he had been experiencing over the previous few weeks. The tests, which were performed and will be discussed, included the Berg balance scale, the single-leg stance test, the 10-meter walk test, and the 5x sit to stand test.

Due to time restrictions, the Berg balance scale was only able to be completed once. To provide more detail into the completion and score by this patient, the Berg balance scale concluded deficits in the functional reach (to 18 cm), turning ability (completed but slowly), alternating feet placed upon a step (unable to complete due to left single-leg stance), impaired tandem stance (small step and balancing), and single-leg stance deficits (attempts on left); this resulted in a score of 44/56. According to Downs et al,[6] a score below 45 indicates a

moderate risk of falling and a score below a 40 indicates a severe risk of falling. The sensitivity and specificity of the Berg Balance Scale for scores of 45 and below in relation to predicting falls was reported to be 25% and 87% respectively. The sensitivity and specificity of the Berg Balance Scale for scores of 45 and below in relation to predicting multiple falls was reported to be 42% and 87% respectively.[7] According to the Shirley Ryan Ability Lab's[8] compilation of data, the Berg balance scale is predictive of falls if the patient with a history of falls scores <51, or if a patient with no history of falls scores <42 (91% sensitivity, 82% specificity). According to both sources, at his present function with a score of 44, this patient would be at risk for future falls. A change in score of 4 to 5 points would also be necessary to depict a significant change in function[6] and as such, taking into account the patient's impairments and categorical scores, the patient would likely not have scored much differently upon a follow-up of the Berg balance scale test.

Due to the neuromuscular impairments present upon the patient's left-sided extremities, it is not surprising that no improvements were yet demonstrated in his left leg single-leg stance times. The patient's single-leg stance time noticeably improved upon the right leg from a time of 1 second to a time of 5 seconds. While this is not clinically significant for a reduction in fall risk, the improvements demonstrated provide encouragement for the continuation and progression of the patient's balance abilities as therapy continued. The goal of therapy was to eventually exceed the 10 second single-leg stance benchmark as this is the number that has been associated with a reduced risk of falls.[9]

The patient's 10-meter walk test results demonstrated statistically and clinically significant improvements between the two evaluations. He improved from 0.28 m/s to 0.40 m/s; which equated to a gain of 0.12 m/s. According to the Shirley Ryan Ability Lab's[10] compilation of data, statistical results document improvement being noticeable with gains of greater than 0.06 m/s for a small change and gains greater than 0.14 m/s for a large change. Whereas, according to a meta-analysis by Wist et al,[2] a change of 0.10 m/s is the cut-off for statistically significant improvement. By either source, this patient's results were promising as he had improved a considerable amount in relatively few therapy sessions. Also, of relevance is his final data, as his score of 0.40 m/s now places him on the cusp of the "limited community ambulators" category of function. Data has demonstrated that individuals who walk at a pace slower than 0.40 m/s are typically more likely to be limited as "household ambulators" whereas those who walk at a speed of 0.40-0.80 m/s are likely to be "limited community ambulators." The eventual goal would be a speed of greater than 0.80 m/s as this would indicate increased ease and safety as a "community ambulator."[10]

This patient's 5x sit to stand score improved by 1.5 seconds. While this change was not meaningful in and of its own, his two scores were (initial=10.43 seconds; final=8.93 seconds). According to the cited-data,[11] a score of 16 seconds on this test discriminated between fallers and non-fallers (75% sensitivity, 68% specificity), and a cutoff score of 12 seconds is discriminatory between healthy subjects and those who have had a stroke. Both scores indicated that this patient was doing well and was functionally proficient.

CHAPTER V

DISCUSSION

Clinical Decision-Making

We accepted this patient due to his recent onset of falls. This patient had not been to a physical therapist in over a year and had recently fallen a couple times with a report of regressive functional mobility likely due to reduced activity. The patient stated he had been working out with a personal trainer twice a week, but his trainer was leaving the fitness center and the patient was in search of a new trainer. The extent of his current training regimen was not fully known. As was previously discussed, he did not realize that trainers were not therapists. At the fitness center, he was mainly working on gross-functional mobility in terms of his walking speed and maneuverability. We encouraged him to use the fitness center and set up the exercises on his own. We also reminded him that other patrons or staff members would likely be willing to assist him and that he could use the equipment at the center to perform the same exercises he had been completing with the trainer. He never attempted to exercise on his own as he always felt more comfortable with someone else nearby for safety and support.

This chapter will continue by discussing the models and methods used to analyze the decision-making processes that went into planning and performing the therapy sessions for this patient.

Wolf's Model of Clinical Decision-Making[12]

Patient

Physical Problem

- The patient's main physical problem was the continued left-sided hemiparesis as a result of the brain tumor and concurrent medical treatment.

Motivation/Family Support/Mental Status

- His motivation was to increase his functional ability and to decrease his risk of falling and the possible resultant injury.
- The patient was married and had two children. His in-laws resided in the basement to assist with the household chores as needed.
- He had limited internal motivation for activity due to his fear of falling. His reliance upon the trainer or therapist was likely in-part due to using the sessions as a social outlet.
- He was always alert and oriented to person, place, time, and situation. He consistently demonstrated a flat affect throughout therapy sessions.

Therapist

Cognitive/Physical Skills

- The patient had a high-level of intelligence and problem-solving ability; he used to work as a civil engineer. He had a good

knowledge of the present and his long-term memory and cognition were cohesive; he demonstrated multiple issues with short-term memory loss over the course of therapy.

- His physical status was quite functional in relation to his left hemi-paresis and he maintained use of a Lofstrand crutch in his right arm at all times.

Psychosocial Factors

- The patient had expectations for therapy staff to accommodate his scheduling difficulties and inconsistent arrivals, to an extent of which the therapy staff did.
- It was unknown to what level the patient had social support outside of his immediate family or medical providers.

Decisions

Evaluation

- Refer to the examination and evaluation section.

Assessment and Goal-Setting

- He demonstrated poor lower-extremity strength, poor flexibility, poor muscular control, and poor activity tolerance.
- Goals:
  - Improve SLST and reduce fall risk.
  - Increase ambulation speed and safety.
  - Decrease low-back pain.
  - Improve hamstring ROM.

- Improve left lower-extremity strength.

Choice of Treatment

- Balance training: seated/standing; static/reactive; stable/unstable
- Lower-extremity strengthening activities
- Gait progression with cues for terminal knee extension and proper posture.
- Treatments were modified for activity tolerance and exercises transitioned between standing and sitting activities to allow for rest periods.
- Sessions were modified in response to the patient's progress and present symptoms.

Measurement of Outcome

- The patient improved in his balance and functional ability (see Table 2). He had been progressing but had not yet achieved his final goals, in part due to limited attendance.

Reassessment

- Reassessment was limited due to attendance difficulties. The patient was expected to continue with physical therapy following the student's departure and was expected to continue working towards his goals. The primary physical therapist would continue with this model as the patient progressed.

Patient Education

As the patient had been to many previous physical therapy, occupational therapy, and speech and language therapy sessions, in both the inpatient and outpatient settings, along with personal training services, this patient had a very good idea of how to improve his functional ability in life. The primary reason he came to physical therapy was to improve his balance and reduce his risk of falling in the future. The therapy sessions were mainly focused on functional tasks, but some of the educational components that took place throughout the six sessions will now be discussed.

As this patient had been an engineer, he was thus very inventive and resourceful in terms of improving his functional ability through devices or changes to his residence; he had adaptations performed on his car to make it easier to operate and he attached a water bottle holder to his Lofstrand crutch. The bottle holder, while something small, was a novel modification and it significantly improved his life as he often became thirsty due to the increased energy expenditure required by his ambulation style. Through brainstorming, a strap which allowed him to utilize the recumbent stepping machine safely was created and the strap was given to him should he want to use the machine at the community center.

The education provided was minimal and mainly focused around encouragement for independence in activity. He continued to be fearful of independent balance activities and always wanted the support of a trainer or therapist, should anything go wrong. In terms of a cost-benefit analysis, we

discussed the cost of physical therapy and the cost of a personal trainer. We attempted to provide options for him to continue these exercises independently at the community center without incurring the healthcare fees, but the patient declined to follow through with the recommendations as he did not want to burden the staff members at the center and was fearful of losing balance.

With his engineering background and statements, the patient presented as a kinesthetic learner in which he preferred to be instructed as he was performing the task. For example, a balance exercise would be introduced with a quick demonstration after which the patient would attempt the activity. Individual instruction continued with tactile and verbal feedback from therapist to patient; all the while the patient would be asking questions and requesting technique feedback. At an early visit, we provided a home-exercise program handout with single-leg balance activities utilizing external support structures depicted and explained, but we soon realized that the home program aspect was not going to occur with this patient due to his motivational level and anxiety about falling.

It was apparent early on that, due to his desire to continue in his functional ways, he was not going to be receptive to education on changes within his daily life. This factor would be the main limitation to the educational effectiveness. Other limitations included that the patient was dealing with some short-term memory issues, thus any education provided was frequently not retained. This, coupled with his intermittent arrival to appointments due to a number of factors, decreased the effectiveness of any changes we encouraged him to make or any progress we would hope to make on his home-exercise program.

Reflective Practice

When I reflect upon this case, I primarily wonder about how we could have better encouraged attendance. While at the therapy sessions, the patient was very productive and worked hard at the activities, as demonstrated by the improvements documented in a short amount of time. But much time was lost due to lack of attendance arising from his memory issues, personal illness, random extended family visits, and personal vacation. The patient was using a calendar application, was very engaged with the online clinic scheduling site, and the clinic also provided reminder phone calls. His absences from therapy were an unfortunate occurrence. Methods to address this issue were unsuccessful.

As the diagnosis was 3 years prior, there were limited improvements we could provide in terms of improving his hemiparesis, and as such we focused our therapy sessions on working with what ability was present and improving his function and safety through the balancing as strengthening activities. The interventions were provided as appropriate and were centered around improving his safety and functional ability.

It could have proven beneficial to have deeper conversations surrounding his compliance with independent exercise and activities, but it was not feasible due to the intermittent nature of the therapy sessions. As the sessions continued following my departure, hopefully more insight into the patient's anxiety about complying with the exercise plan would become evident so that modifications to the home exercise program may be implemented.

APPENDIX

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A Case Report: Factors Influencing the Physical Therapy Care following Medical Treatment of an Anaplastic Oligodendroglioma

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Abstract

Purpose. The purpose of this case report is to describe the clinical decision-making processes of the physical therapy (PT) care for a patient who was diagnosed with an anaplastic oligodendroglioma and subsequently had surgical decompression and resection, chemotherapy, and radiation.

Background. Anaplastic oligodendrogliomas account for 3% to 20% of all brain tumors. The incidence of this tumor is 40% greater in males than females. Average onset occurs between 35 and 44 years of age. Anaplastic oligodendrogliomas commonly occur in the frontal lobes and are supratentorial. Patients will often present with headaches, new weakness, vision changes, and a decline in cognitive functioning; seizures are also a possible clinical sign.

Case Description. The patient was a 39-year-old male who was diagnosed with a grade III anaplastic oligodendroglioma. He underwent surgical decompression and resection, chemotherapy, and radiation. He participated in 4 months of PT following the surgery (1 month inpatient and 3 months outpatient), an additional 6 months of outpatient PT following a set-back due to scar tissue formation 2 years later, and presented to outpatient PT for a third time since the surgery due to recent falls.

Intervention. Interventions included balance training, lower extremity strengthening, and gait progression retraining.

Outcomes. The patient improved in his single-leg stance test (SLST) balance ability, five times (5x) sit to stand test time, and 10-meter walk test (10MWT) scores.

Discussion. Due to attendance issues, this patient did not progress as quickly as projected. Many personal and familial factors played a role throughout the therapy sessions.

Case Description

- The patient was a 39-year-old male who was diagnosed with a grade III anaplastic oligodendroglioma. He was a husband, a father of 2 young children, and a civil engineer. He underwent surgical resection and decompression, chemotherapy, and radiation to remove and destroy the brain tumor.
- He participated in 4 months of physical therapy (1 month inpatient and 3 months outpatient) following the initial surgery, chemotherapy, and radiation.
- He returned to work as a civil engineer at 30 hours/week but could not keep up with the demands and eventually transitioned onto disability insurance.
- Two-years post decompression, he had a setback in function due to the buildup of scar tissue and returned to outpatient physical therapy for 6 months.
- He returned to physical therapy for a third time following the new onset of falls. The goals for physical therapy were to improve his balance and strength ability leading to increased safety around the house and community.

Examination and Evaluation

Patient Observation
- Lofstrand crutch in right hand; flaccid left upper extremity (UE)
- Step-to, antalgic gait pattern; hyperextended left lower extremity (LE)
- Poor postural control in standing and sitting
- Facial drooping on left; glasses continually repositioned

Examination and Evaluation Results
- Low back pain and left shoulder pain (rated 4/10 pain)
- Left UE Modified Ashworth Grade 2
- Left LE strength, via manual muscle testing (MMT), 3/5 proximally at hips and progressing to 0/5 distally at ankles
- Right LE strength, via MMT, 4/5 globally in all motions
- Bilateral hamstring tightness limiting straight leg raise range of motion (ROM) to 45 degrees

Table 1. Balance and Functional Tests

	Initial	Final	Change
Normal Stance (Eyes Closed)	10+ sec.		
Normal Stance (Eyes Open)	120+ sec.		
Single-Leg Stance Test – Right leg	~1 sec.	~5 sec.	+4 sec.
Single-Leg Stance Test – Left leg	<1 sec.	<1 sec.	none
5x Sit to Stand Test	10.43 sec.	8.93 sec.	-1.5 sec.
Berg Balance Scale	44/56		
10-Meter Walk Test	.28 m/s	.40 m/s	+.12 m/s

Plan of Care

- Intervention goals were to address balance, LE strength, and gait impairments.
- The clinic adjusted schedules to accommodate for the patient as available and the administrative assistant provided phone call reminders on the day of appointments.
- Treatment sessions were modified in accordance to patient's activity tolerance and other compounding factors.
- The factors influencing this patient's plan of care, adherence to, and ability to progress in physical therapy were analyzed utilizing a Johari Window model (Table 2).

Table 2.

	Known by Patient	Unknown by Patient
Known by PT	▪ Left Hemiparesis ▪ Functions around house and community; able to drive ▪ Returned to work for a short time period ▪ Decreased activity tolerance ▪ Maintained cognitive abilities ▪ Tech savvy ▪ Easily irritated ▪ Husband, father, engineer	▪ Short-term memory issues ▪ Depends on therapy/training sessions for social support ▪ Support staff makes accommodations to scheduling and reminder calls; patient eventually comes to expect therapist availability ▪ Fear of burdening others
Unknown by PT	▪ Reads every medical note; becomes annoyed when medical professionals copy forward notes ▪ Depth of family structure and support available ▪ Social support outside of family	▪ Psychological well-being

Disease Taxonomy

NAGI Scheme

Active Pathology: A brain tumor resulting in surgical decompression with radiation and chemotherapy.

Primary Impairments: Left hemiparesis, decreased strength and coordination (UE>LE), impaired cognitive functions
Secondary Impairments: Subluxation of left glenohumeral joint, decreased hamstring length

Functional Limitation: Decreased safety and speed with ambulation and decreased performance of fine-motor tasks. Decreased strength, balance, and activity tolerance. Presents with short-term memory losses and personality changes.

Disability: Inability to maintain employment. Modifications to driving. Decreased ability to take care of children and perform household duties. Decreased ability to maintain a schedule and arrive to appointments on time. Decreased ability to interact at a higher level socially with emotions and personality.

Clinical Decision Making

Wolf's Model of Clinical Decision Making

Patient

Physical Problem
- Side-effects from brain tumor and medical treatment

Motivation/Family Support/Mental Status
- Wants to increase functional ability and decrease risk of falling and injury
- Limited internal motivation for activity
- Wife and children; in-laws residing in basement
- Alert and oriented to person, place, time, and situation

Therapist

Cognitive/Physical Skills
- High-level of intelligence and problem solving
- Difficulty with scheduling and short-term recall
- Left hemi-paresis, UE>LE, and use of Loftstrand crutch

Psychosocial Factors
- Maintains flat affect throughout sessions
- Anger, coping issues, and memory loss
- Expectations for therapy staff to accommodate

Decisions

Evaluation
- Refer to the examination and evaluation section

Assessment and Goal-Setting
- Poor LE strength, poor flexibility, poor muscular control, poor activity tolerance
- Goals
  - Improve SLST
  - Decrease low-back pain
  - Improve hamstring range of motion
  - Improve left LE strength

Choice of Treatment
- Balance training
  - Seated/standing; static/reactive; stable/unstable
- LE strengthening
- Gait progression
  - Cuing for terminal knee extension, posturing
- Treatments modified for activity tolerance; transitioned between stand/sit activities
- Modified sessions in response to patient progress

Measurement of Outcome
- Improved in balance and functional ability
- Had progressed but not yet achieved goals

Reassessment
- Reassessment was limited due to attendance
- Patient was expected to continue with physical therapy following the student's departure
- Primary physical therapist would continue with Wolf's Model as the patient continues to progress and receive physical therapy services

Acknowledgements

I would like to thank my clinical instructor and faculty advisor for all of their support and assistance throughout my clinical rotation and construction of this case report.